

ferences. His influence on the research done by his pupils at Manchester is easily traced, and all of them would acknowledge the inspiration and encouragement of many a half-hour's chat with the professor, perambulating the corridor to and fro in a thoroughly characteristic manner.

Some months ago Prof. Schuster announced his intention of vacating the chair of physics to allow more leisure for the literary work and theoretical research to which he has recently devoted himself more particularly. To the satisfaction of his colleagues at Manchester, it has been decided, however, that his connection with the college shall not cease, but that he will continue to direct some of the research, and the council has therefore appointed him "honorary professor." His place as Langworthy professor and director of the laboratory has been filled by the appointment of Prof. E. Rutherford, F.R.S., of Montreal, who arrived in Manchester a short time ago and organised some researches, though not nominally in charge of the laboratories until the commencement of the October session. Prof. Schuster at present is engaged in the study of the permeability of iron at high temperatures under high pressures, especially with a view to discover the effect of high pressures in changing the temperature, between 800° and 900° C., when the metal suddenly loses most of its magnetism. Pressures up to 1000 atmospheres are contemplated. A second problem under investigation is the effect on the rate of decomposition of radio-active substances of extremely high pressures, such as are met with deep down in the earth's crust. In both these problems the design of the high-pressure portion of the apparatus has been due to Dr. Petavel, and for the latter purpose Mr. Cook, the university mechanic, has succeeded in constructing a combined pump and ram, in which pressures up to 37,000 pounds per square inch can be maintained without perceptible leak over long periods. The effect on radium of pressures up to 2000 atmospheres has been studied, and an account of the experiments will be ready shortly.

The accompanying photograph of Prof. Schuster in the laboratory was taken specially by Mr. Warwick Brookes.
J. A. HARKER.

A NEW METHOD OF COLOUR PHOTOGRAPHY.

THE latest method of colour photography is distinguished as the "Warner-Powrie" process, and is well illustrated at the first exhibition of the Society of Colour Photographers, which will close on October 26. It will presumably be some little time before the plates are generally obtainable, but so far as can be judged from the examples shown and the details of their preparation, it is a process that will offer special advantages. Mr. Powrie has been working at the subject for many years, and has succeeded in producing a triple-coloured lined screen with better and finer lines than has been possible by previous methods, and without either gap or overlap. He discards ruling in favour of a very ingenious method of printing that does away with all need for the troublesome registration that becomes almost impossible with fine lines. The glass is coated with a bichromated colloid, exposed under a black-lined screen that has spaces half the width of the lines, and developed in warm water. This leaves the colloid in lines with spaces of bare glass twice as wide as the lines. By immersion in a solution of a green dye the lines are stained, and by the application of formalin or chrome alum the colloid is made quite

insoluble and the dye fixed. The plate is coated again, exposed under the same black-lined screen, the only precaution being that the green lines already made shall be covered with the black lines of the overlying screen. After exposure and development the plate is immersed in a solution of a red dye to stain the second set of lines, and again treated with a hardening agent. The plate is coated once more, and this time exposed alone with its back to the light, so that the red and green lines already made serve to protect the coating from light action. So after development all the remaining spaces are exactly filled with colloid, and this is then dyed blue. The prepared plate is coated with a suitable photographic emulsion, and can be used in a similar way to the "autochrome" plates of Messrs. Lumière, which we have already described. The chief difference between the two apparent by mere inspection is that the colours are in lines instead of as a random grain. But the lines can be made so fine that they are invisible to a normal eye without assistance.

It is obvious that the "autochrome" and the "Warner-Powrie" plates, and any plates in which the surface is apportioned to three colours for colour reproduction, must absorb about two-thirds of the light that would pass through them if the colours were not there. A simple colour, such as red, is produced by a silver deposit that covers the green and blue colours that are in the area that is required to be red, and this area is therefore one-third red and two-thirds black. A print on a "bleaching-out" paper (as the "Uto") would give its colours mixed with a double area of black, and therefore be uselessly dark. It is difficult, if possible, to obviate this with a random distribution of the colours, but Mr. Powrie, with his plates, overcomes the difficulty by separating the plate and the paper with a thin sheet of celluloid or glass, and by two mirrors on opposite sides of the printing frame gets oblique light in two directions, as well as direct light at right angles to the surface, and so causes each coloured line in the plate to give a line on the printing paper three times its width. In this way, each colour—red, green and blue—produces its effect over the whole surface of the paper, the colour patches are continuous (free from black), and what should be white parts are completely bleached instead of being coloured like the original. In the same way, but using ordinary plates, and red, green and blue light separately for the exposures, a separate negative can be obtained of each of the three colours, with a continuous image on each, and these can be used for any method of three-colour printing. A single exposure on a single plate will thus give all that is necessary for the preparation of the three colour records which hitherto have been obtained by separate and generally consecutive exposures on the original.
C. J.

MR. HOWARD SAUNDERS.

IT is with unfeigned regret that we record the death of Mr. Howard Saunders, after a long and painful illness. Mr. Saunders was born in London in 1835, and was therefore seventy-two at the time of his death. He was educated privately—to a great extent at Dr. Gavin Smith's school at Rottingdean, near Brighton, where he is said to have developed that taste for ornithology by means of which he attained eminence in later years. Immediately after leaving school he entered on a business career, and at the age of twenty joined a mercantile house at Callao. Five years were spent by him in Chili and Peru, where archæological studies appear to have

chiefly occupied his leisure. In 1860 he crossed the Andes, reaching the headwaters of the Amazons, and descending that river to Pará, in Brazil, where he made his first long halt. Few Englishmen had at that time made a similar journey, which appears to have been fraught with difficulty.

After this journey Mr. Saunders returned to England, and devoted himself to the study of ornithology in real earnest. In South America he had acquired an intimate acquaintance with the Spanish language, so that in the numerous visits he paid to Spain between the years 1863 and 1870 he found himself thoroughly at home. Owing to these frequent visits he became a recognised authority on the ornithology of the Spanish peninsula, and in the year 1869 he published in the *Ibis* the first of a series of important papers on that subject.

To those members of the British public interested in birds, Mr. Saunders is, however, much better known as the editor of the third and fourth volumes of the fourth (and last) edition of "Yarrell's British Birds," the late Prof. Newton, who had edited the two earlier volumes, having found himself unequal to the task of continuing the work, at the rate of issue deemed necessary by the publishers. This work is alone a monument to the extensive knowledge and unflagging industry of Mr. Saunders. In addition to the conciseness and yet fulness of his descriptions, the text of these two volumes is noteworthy on account of the minuteness of detail with regard to the geographical distribution of the various species. The first part of vol. iii. appeared in 1883, and the last volume was completed in 1885.

This, however, was by no means the only work on British birds by Mr. Saunders. In 1887 he published a list of the birds of our islands; and in 1888-9 "An Illustrated Manual of British Birds," which originally appeared in parts, and of which a second edition was issued during the years 1897-9. Terns, gulls, and skuas were a group of birds in which Mr. Saunders was specially interested, and he was engaged by the Trustees of the British Museum to write the volume on this group (*Gaviæ*) for the famous series of "Catalogues," of which this volume is the twenty-fifth. It was published in 1896. He was one of the contributors to the "bird volume" of the scientific results of the cruise of the *Challenger*, which appeared in 1881, and likewise wrote the article Birds in the "Antarctic Manual." He was also joint-author of the "Birds of Lancashire," and had, indeed, an almost unrivalled knowledge of the county distribution of British birds. His papers in the *Ibis*, in addition to those on the birds of Spain, are numerous, and, needless to say, valuable.

At an early stage in his career Mr. Saunders became a member of the British Ornithologists' Union, at the meetings of which he was a regular attendant, while he also took a large share in the management of that body. He was a Fellow of the Linnean, the Zoological, and the Royal Geographical Societies, and served on the council of each, as well as contributing largely to the publications of the second named. The Society for the Protection of Birds also claimed his interest. For several years (1880-5) Mr. Saunders was secretary of Section D of the British Association; he was also a member of the American Ornithologists' Union, and on the foreign list of the Société Zoologique de France and of several other Continental scientific bodies. In addition to ornithology, Mr. Saunders also took an active interest in geographical research, especially that connected with the exploration of both polar regions. His death will be felt as a personal loss by a large circle of scientific friends, both in this country and abroad.

R. L.

NO. 1982, VOL. 76]

NOTES.

THE first Press messages by wireless telegraphy were transmitted by the Marconi system across the Atlantic Ocean, between Ireland and Cape Breton, on October 17. Several congratulatory messages were exchanged between the two continents. The Governor-General of Canada dispatched a message from Ottawa congratulating the King "on the establishment of a fresh link between Canada and the Motherland," to which His Majesty replied on the following day by the same method of communication:—"His Majesty the King to Earl Grey, London, October 18.—I thank you for your telegram. I am delighted that wireless Transatlantic telegraphy should unite the bonds between Canada and the Mother Country so closely.—EDWARD R." The Irish station is situated on a headland facing the Atlantic, about four miles from Clifden, in Galway, and is the largest wireless installation in the United Kingdom. A number of tall masts, arranged in a line facing seawards, contain a network of wires on which messages are received and dispatched. The operators have a telephonic apparatus with a sensitive sounder attached to their ears, and it is their trained sense of hearing and distinguishing the Morse signals transmitted that enables them to detect the signals. It is stated that signals are sent and received simultaneously, and that a speed of about thirty words per minute has already been attained. Full particulars of the modifications in the apparatus and plant which have made the success of last week possible will doubtless be forthcoming in due course. Mr. Marconi and those at work with him are to be congratulated upon their triumph over practical difficulties, and men of science have reason for satisfaction in this remarkable development of means of communication by means of ether waves. The Marconi Company state that any delays in the transmission of messages by their system between North America and the United Kingdom are attributable entirely to delays on the land lines. The company claims that with a private wire from its station at Glace Bay to Montreal, and from the Irish station to London, the service between London and Montreal will immediately compare favourably with the cable service in point of speed.

THE Faraday lecture was delivered by Prof. Emil Fischer, professor of chemistry in the University of Berlin, at a meeting of the Chemical Society held on October 18 at the Royal Institution. Sir William Ramsay, K.C.B., president of the society, was in the chair. An abridgment of the lecture appears in another part of the present issue. At the conclusion of his discourse a medal was handed to Prof. Fischer by Sir William Ramsay as a mark of appreciation by the Chemical Society of his scientific work. Sir Henry Roscoe proposed a vote of thanks to the lecturer, and remarked that the great interest of the lecture is due, not only to the fact that Prof. Fischer is a master of his subject, but also because the application of synthetic chemistry to biology is a subject that at the present time exceeds in interest and importance any other branch of the science. In seconding the vote, Sir James Dewar mentioned that the centenary of the isolation of potassium and sodium by Davy fell on the day following that of the lecture.

THE death is announced of Prof. A. Fürtwangler, professor of classical archæology in the University of Munich, and a prolific writer on archæological subjects.

THE council of the Royal Meteorological Society has awarded the Symons gold medal for 1908 to M. L.